Wedron Silica

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Illinois Environmental Protection Agency
Air Pollution
2200 Churchill Road
Springfield, Illinois

Dear Air Emissions Official:

Please find enclosed the follwing materials for a mobile crushing unit and associated transfer points located at Wedron Silica Company's sandstone mining operation near Wedron, Illinois:

* Form APC 220 for each fugitive emission source.
* Form APC 200 for Mobile Crusher unit.
* Process Description for above operation.

If you have any comments or question please do not hesitate to contact me at 616-465-5833 or 1-800-255-7263.

Sincerely,

Edward J. Clements

Enc.

PROCESS DESCRIPTION AND CALCULATION OF FUGITIVE EMISSIONS

After being loosened by blasting, sandstone that is mined at Wedron Silica's sandstone mining operation (figure 1, location diagram), is delivered to a mobile rock crusher. The sandstone is dumped into a hoppered feeder onto screens (figure 2, flow diagram) at an average rate of 750 ton/hr (maximum rate of 1000 ton/hr) with a front end loader. The material that passes through the screen is crushed and drops onto a conveyor that transports it to a steel tank where it is mixed with water and is subsequently pumped to the main plant for drying, screening, bagging and shipping.

The nature of the sandstone that is mined is very soft and breaks down easily and only primary crushing is required. The sand is also very moist (10.0%) as the bulk of the material is mined beneath the water table. Only negligible amounts (<0.1 lb/min) of fugitive dust are generated from the crushing operation.

EMISSIONS CALCULATIONS

Factors and an empirical expression used in these calculations are based upon the 11.19.2 CRUSHED STONE PROCESSING Section which will be included in the new fifth edition of AP-42 scheduled for publication this fall. This new AP-42 section, which is now available on EPA'S Air Chief Bulletin Board, contains the new emission factors developed from test data from a cooperative testing program between the National Stone Association and the USEPA.

Hopper Loading

The quantity of particulate emissions generated by a batch drop operation, per ton of material transferred, may be estimated using the following empirical expression:

$$E = k(0.0018)\frac{\left(\frac{s}{5}\right)\left(\frac{U}{5}\right)\left(\frac{H}{5}\right)}{\left(\frac{M}{2}\right)^{2}\left(\frac{Y}{6}\right)^{0.33}}$$

Equation 1

Where: E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed (mph)
M = material moisture content (%)
s = Material silt content (%)
H = drop height, ft
Y = dumping device capacity, yd^3

The particle size multiplier, k, varies with aerodynamic particle diameter, as shown in Table 1.

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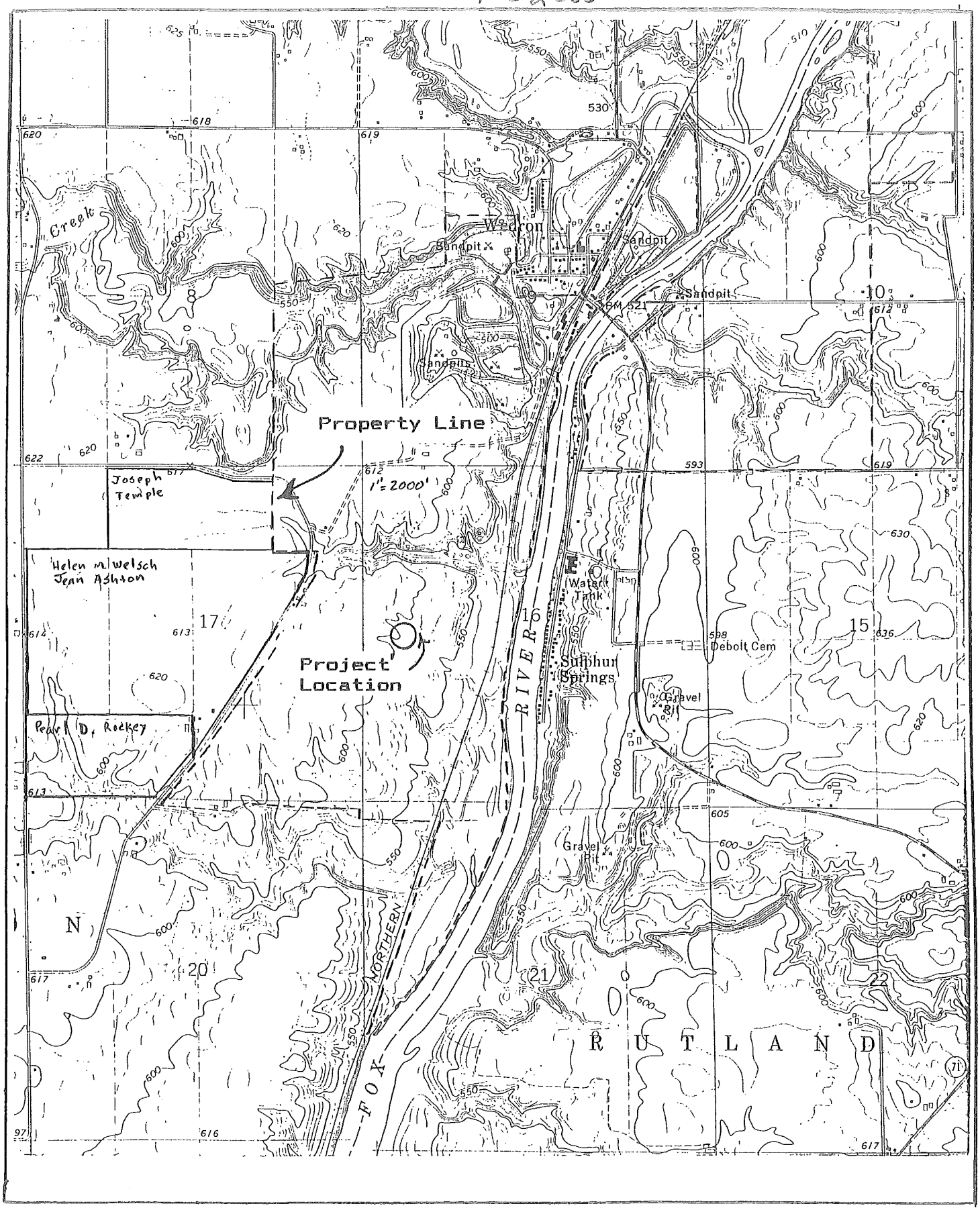
Mobile Crusher Location Map

1" = 2000'



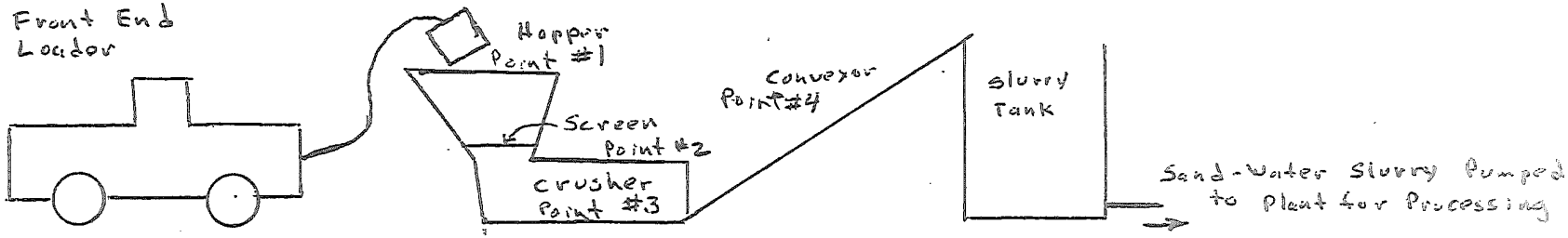


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Figure 1 Process Flow Diagram
Mobile Crusher

TABLE 1. AERODYNAMIC PARTICLE SIZE MULTIPLIER (k)

< 30um	< 15um	< 10um	< 5um	< 2.5um
0.73	0.48	0.36	0.23	0.13

Worst case emissions occur under dry windy conditions. Worst case emissions from materials handling operations are calculated by substituting into Equation 1 appropriate values for moisture content (10% in our case) and the anticipated wind speeds during worst case averaging period of 24 hours (a value of 8 mph is used in this calculation).

Using 0.73 for the aerodynamic particle size multiplier, 8.0 mph for the average wind speed, 10.0 for the material moisture content, 2.5 for silt content, a drop height of 1.0 ft. and a dumping device capacity of 3.0 yd^3 the emission factor for the dropping actions associated with hopper loading is 0.0041 lb/ton. Using an average loading rate of 750 ton/hr 3.07 lb/hr is generated, for a maximum loading rate of 1000 ton/hr, 4.10 lb/hr of fugitive particulate matter is generated. See Table 2 for summary of emissions.

Screening

Using a value of 0.00089 lb/ton of particulate matter emitted during the screening of moist sand and assuming a maximum of 1000 ton/hour processed and an average of 750 ton/hr, a maximum of 0.89 lb/hr (0.015 lb/min) and an average of 0.67 lb/hr (0.011 lb/min) fugitive emissions are emitted during screening.

Crushing Unit

Using an emission factor of 0.00021 lb/ton for wet sandstone crushed, and an average crushing capacity of 750 ton/hr, a maximum crushing capacity of 1000 ton/hr, an average 0.16 lb/hr (0.0026 lb/min) and a maximum of 0.21 lb/hr (0.0035 lb/min) fugitive particulate matter are generated.

Conveying from Crusher to Slurry Tank

Using an emission factor of 0.00010 lb/ton of wet material transferred, and an average transfer rate of 750 ton/hr and a maximum of 1000 ton/hr, an average of 0.075 lb/hr and a maximum of 0.10 lb/hr of fugitive particulate matter is generated

TABLE 2. SUMMARY OF EMISSIONS

Process Desc.	Avg. Material Throughput (Max) Ton/hr	Emission Factor lb/ton	Avg Emissions PM_{30} (Maximum) lb/hr
Hopper Load	750 (1000)	0.0041	3.07 (4.1)
Screening	750 (1000)	0.00089	0.67 (0.89)
Crushing[1]	750 (1000)	0.00021	0.16 (0.21)
Crusher Conveyor	750 (1000)	0.00010	0.075 (0.10)

Based on the above calculations it is apparent that fugitive emissions from the equipment listed above are negligible.

* Primary dry crushing factor for Filterable PM used with a wet suppression ($\geq$ 1.5% water) control factor of 70%.